WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

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* THERMOELECTROSTATIC POWER

Studies by the National Aeronautics and Space Administration indicate "considerable promise" for a thermoelectrostatic power generation system for space flight applications. Laboratory experiments are said to have demonstrated the feasibility of a process in which a solar heating cycle is combined with an electrostatic cycle.

✓ Capacitor Employed -- The power unit is described by NASA as a thin film, solid dielectric capacitor alternately heated by solar radiation and cooled by radiant emission. Incident heat power from the sun's radiant thermal energy is converted to electrical power in this cyclic process.

In simplified laboratory experiments, a section of capacitor film was stripped directly from a commercial capacitor and employed in a special testing apparatus. In various experiments voltage was observed to increase as sufficient heat was applied to the film, and to drop as the film was cooled. This is said to have clearly demonstrated the principle of the system.

✓ Potential -- NASA studies are said to indicate that values of specific power of several kilowatts per kilogram of generator weight may be possible with this system. The conclusion: "since these values of specific power are two orders of magnitude over values obtainable at present, the system shows considerable promise" for space propulsion.

(Studies by B. H. Beam, Ames Research Center, Moffett Field, California. Details available in NASA Technical Note TN D-336, Available from NASA, Attn: Code BID, Washington 25, D.C.

* NASA AWARDS SOLID FUEL BOOSTER STUDIES

Three firms will do preliminary design studies for NASA on solid fuel boosters for space vehicles weighing one to seven million pounds. Grand Central Rocket Co. will study and design a solid first stage for vehicles in the one million pound class; Thiokol Chemical Corp. a first stage for a vehicle in the seven million pound class, and Aerojet General Corp. will study and design stages for vehicles in both weight ranges.

Studies will include details on unit and development costs, fabrication methods, logistics, and methods of mating to upper stages. The firms will also make general designs of liquid-fueled upper stages where necessary to obtain "realistic overall vehicle performance." Total cost of the three six-month contracts is $225,000.

*GOVERNMENT R&D OPPORTUNITIES

✓Organic Synthesis -- The Army Chemical Corps is interested in educational institutions located in Central and North Atlantic Coastal states which have research and development capabilities in the field of organic synthesis. Complete information on scientific and technical personnel and facilities, as well as background information on previous projects is requested. (Contact: U.S. Army Chemical Center Procurement Agency, Army Chemical Center, Md.)

✓Shadowgraph Station -- The Air Force is interested in firms which have the research and development capability to develop and produce an evaluation prototype shadowgraph station for a hypervelocity range. This must include the capability of incorporating a number of these stations in a shadowgraph system. A six-to-nine month study contract is contemplated. Information required includes number of employees and qualifications of scientists, engineers and technical personnel, description of general and specific facilities, outline of previous projects, and any descriptive literature. (Contact: Directorate of Procurement, Attn: AEK, Arnold Engineering Development Center, Arnold Air Force Station, Tenn. by November 14, 1960)

✓Reinforced Plastics -- The Army is interested in finding organizations with research and development capabilities in the field of adaptation of reinforced plastics and other new materials to such Army aircraft landing components as power transmission systems, landing gears, etc. Information required is similar to Shadowgraph Station above. (Contact: U.S. Army Transportation Command, Ft. Eustis, Va. Attn: Research Contracting Officer. Telephone inquiries should go to Newport News, Va. TRinley 7-1311, Extension 21997, CWO Willis L. Scoggins.)

*NAVY TO RUN VTOL PROGRAM

Navy takes over as administrative agent of a tri-service program directed toward prototype development of an operational vertical take-off and landing (VTOL) transport aircraft for so-called "operational suitability testing."

First step in the new program will be a design competition based on type specifications which the Navy will develop in coordination with the Army and Air Force. The prototype expected to result will then be evaluated by agencies to be selected by the military departments. Each service will contribute equal funds over a four-year period.

The Pentagon says that a number of surveys and reviews of the VTOL field "made one point quite evident." This is the belief that the operational problems associated with such advanced aircraft "remain highly speculative."

Study groups have recommended that operational research aircraft be developed to explore such problems as the effects of high down wash velocities, complexity of control, maintenance requirements and capability to operate under various conditions of flight.

The Defense Department's official view:

"The operational questions must be answered before realistic plans can be made and detailed requirements prepared by each of the three Services for advance types of VTOL aircraft to perform specific missions. Although the specific requirements of the three Services for aircraft to perform their assigned missions may not be identical, the operational problems are sufficiently similar that one type of test and evaluation vehicle should provide answers applicable to each Service."

* FAA EXPANDS NAVIGATION AIDS

Federal Aviation Agency expects to spend $163,250,000 this fiscal year on air navigation facilities, air traffic control equipment and special purpose buildings.

Program Includes:

✓ Construction of nine transition terminal air traffic control center or air route traffic control center buildings. Average cost: $1,900,000

✓ Purchase and installation of thirteen long-range radars. Average cost: $2,400,000.

✓ Purchase and installation of 41 radar bright displays. Average cost: $405,000. The displays can be used in brightly lighted rooms.

✓ Purchase and installation of 14 radar beacon systems to provide controllers with more positive identification of radar targets. Average cost: $293,000.

✓Establishment of terminal very high frequency omnidirectional radio ranges (VOR) at 17 airports. These VORs are used as an approach aid to airports. Others are used for en route navigation. Average cost: $104,000.

✓ Installation of teletypewriter equipment at 30 locations for delivery of meteorological information to the U.S. Weather Bureau. In addition, the Alaska teletypewriter circuit will be modernized. New high-speed teletypewriter circuits will be provided at eight cities. Average cost: $342,000.

✓ A total of 17 airports will be equipped with high intensity approach lighting systems with sequenced flashing lights. These flash in sequence from the end of the approach lighting system in toward the approach end of the runway, thus giving a pilot landing under bad weather conditions more visual information to aid his landing. Average cost: $205,000. In addition, other systems will be fitted with the sequenced lights.

* BALLISTIC MISSILE DEFENSE

The Pentagon has established a Special Technical Advisory Group for Ballistic Missile Defense for exchange of information and ideas. Members and alternates are Dr. George Zissis and Dr. G.H. Suits, Willow Run Laboratory; William S. Holmes and George M. Cash, Cornell Aeronautical Laboratory; R.L. Leadabrand and Dr. A.R. Tobey, Stanford Research Institute; and D.E. Dustin and Dr. V.A. Nedzel, Lincoln Laboratory.

* NUCLEAR TESTING

Here are the views of Atomic Energy Commissioner Robert E. Wilson on possible results of an end to the current nuclear test ban:

✓ New and revolutionary types of nuclear weapons could be developed -- particularly small battlefield devices designed to put troops out of action quickly and effectively, with a minimum of effect on people at a distance.

✓ Designs of nuclear weapons particularly tailored to recent and prospective new defense systems could be developed. Dependability and safety could be reliably checked.

✓ It would be possible to increase substantially the yield-weight ratio of many "older" bombs and warheads -- which would also be of value for new missiles.

✓ It might be possible to produce thermonuclear weapons without fission fallout.

TECHNICAL TRENDS

□ A technical briefing will be held at Wright-Patterson Air Force Base Ohio, November 2, 1960 for organizations interested in a contract to design, develop, fabricate, install and demonstrate the performance of an instrumentation system for aerodynamic free flight research in the Mach 0.8 to 10.0 range.√√√ The General Services Administration wants to buy 3,758 industrial diamond dies for the national stockpile. For information contact Robert Ross or Dederick Woodward, Industry Branch, GSA Defense Materials Service, Washington 25, D.C. or telephone EXecutive 3-4900, Ext. 2672.√√√ Shipments of electrical measuring instruments by U.S. manufacturers for the first quarter of 1960 are valued at $35.2 million. For details ask Information Office, Business and Defense Services Administration, U. S. Department of Commerce, Washington 25, D.C. for Announcement BD-60-176.

□ The Air Force plans to launch Ryan Aerolab sounding vehicles from Wallops Island, Va., in January in tests of a new and reportedly extremely accurate survey method. The rockets will carry high intensity flares used in conjunction with special tracking cameras stationed at remote points of the earth. Each will be focused on a predetermined area in space at rocket launch time. They will record the relative location and distance of the flashes. Distances on the earth's surface between any two of the camera locations will be determined by triangulation.

□ The Navy estimates that over 30 percent of the anticipated cost of a Talos guided missile cruiser is involved in the purchase and development of equipment of an electronic nature. Half the cost of an A2F aircraft is composed of electronic equipment. √√√ The Interior Department expects little change in planned procurement of major petroleum products by Defense Agencies for the remainder of this fiscal year. A breakdown of plans by product is available from the Information Service, U. S. Department of the Interior, Washington 25, D. C. Ask for Announcement P. N. 82131-60.√√√ The Army has chosen Bell's HU-1A Iroquois for its new helicopter instrument trainer. √√√ National Aeronautics and Space Administration has awarded a $6 million contract to Chance Vought as prime contractor for the Scout Launch Vehicle system. A Scout may be tested for orbital flight before the end of the year.

□ Federal Trade Commission, Washington 25, D.C. is considering a request by the Hercules Powder Company to establish a separate generic name for stereo-regular polypropylene. The term "prolefin" is suggested. √√√ Japanese exports of electronic products to the U.S. in the first six months of 1960 totalled $38.7 million compared with $22.1 million a year earlier. Details are in Announcement BD-60-174 available from Information Office, Business and Defense Services Administration, Washington 25, D. C. √√√ The Federal Communications Commission will lend copies of its revised list of transmitters and monitors considered acceptable for use in aural (AM and FM) broadcast services. The copies may be reproduced by interested organizations, and are available through the Technical Research Division of the Office of Chief Engineer, FCC Washington 25, D.C.

□ Lockheed Aircraft and the Sperry Phoenix Company are completing preparation of a program for pilotless versions of F-104 Starfighters to be used in tests of the nation's air and missile defense system. √√√ The Army and Thiokol Chemical Corporation have successfully static-tested the small, spherical solid propellant motor designed for the third stage of the Nike Zeus anti-missile missile.

RESEARCH CHECKLIST

□ HIGH-TEMPERATURE DRY FILM LUBRICANTS: Studies by the National Aeronautics and Space Administration indicate considerable promise for the use of certain oxide and halide coatings as dry film lubricants at temperatures to 1500° F. The research is expected to have particular bearing on the design of components for space vehicles and aircraft in which weight savings are important. In laboratory experiments, promising results were obtained with ceramic-bonded calcium fluoride on Inconel X. A coating of cobalt oxide ceramic was also found to be of possible use for high-temperature application in which wear reduction is a prime concern, and fairly high friction coefficients can be tolerated.

(Studies reported by H. E. Sliney, NASA Lewis Research Center, Cleveland, Ohio. Details available in NASA Technical Note D-478 available from NASA, Attn: Code BID, Washington 25, D.C.)

□ ABORT SYSTEM FOR TEST SLEDS : The Air Force believes it may save as much as $200,000 annually through the use of 10 cents worth of wire in the sled testing of aircraft escape systems. The wire is used to automatically cut off power to a screen box that sets off the ejection seat powder charge. This means that on high speed runs, where sleds do not reach maximum velocity, all that is expended is the rockets that fire the sled. The costly instrumented dummy, escape system, and other equipment is saved for succeeding tests.

(Developed by D.W. Button, Air Force Flight Test Center, Edwards Air Force Base, Calif.)

□ ELECTRONIC STREAM MEASURING DEVICE : Research sponsored by the Department of Agriculture has resulted in development of an automatic recording device that simultaneously determines the changing shape of the water surface and bottom of sandbed streams. The unit, a Dual Channel Stream Monitor, operates on the Sonar principle. Two transducers direct sound waves from a probe to either the water surface or a streambed, with reflecting time providing the desired information. The five-pound unit has ranges of one or five feet, controllable by a switch. It is said to have a number of advantages over present devices, which are said to lack sufficient accuracy, while requiring manual recording.

(Device developed by Colorado State University under contract to the Sedimentation Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Oxford, Miss.)

□ MEASURING TIRE TREAD WEAR : A new method for measuring the rate of tire tread wear has been developed for the Army Ordnance Tank-Automotive Command. Tread wear is one of the most important performance characteristics of tires and is generally evaluated under expensive and time-consuming road service conditions. With the new method, tires are held against the inner surfaces of a cylindrical indoor roadway that revolves at a selected speed for test runs of 50 miles or more. The variables present in road testing are said to be rigorously controlled so that reproducible data may be obtained for comparing different tires.

(Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for details of Laboratory Method for Measuring Tire Tread Wear)

PUBLICATION CHECKLIST

- ☐ MATERIALS RESEARCH AND DEVELOPMENT, an excellent survey and summary of recommendations concerning the materials research and development program of the Department of Defense. Covers the subject of materials ranging from iron and steel to plastics; materials systems; qualities of materials; fabrication and other facets. 54 Pages. $1.50 (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for PB 161 865.)

- ☐ LIFE SCIENCES AND SPACE, a Congressional report raising some interesting prospects for the future of bioastronautics, and questioning the current Government organization of this type of endeavor. 21 Pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Building, Washington 25, D. C. for House Report No. 2227, Life Sciences and Space.)

- ☐ NUCLEAR REACTOR DIRECTORY, a useful official guide to nuclear reactors, built, building or planned in the United States as of June 30, 1960. Covers civilian, military and production reactors, exports, and critical assembly facilities. 23 Pages. Single Copies Free. (Write Office of Technical Information Extension, P. O. Box 52, Oak Ridge, Tenn. for Publication TID - 8200 (Second Revision).)

- ☐ SUPERCONDUCTIVE TECHNIQUES FOR COMPUTING SYSTEMS, the complete proceedings of a Navy-sponsored symposium held in Washington in May, 1960. The meeting was designed to bring together cryogenic device researchers in order to present a complete picture of applications of superconductivity to computers, computing systems and information processing devices. 413 Pages. (Available through military channels or at $4.50 from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for ONR Symposium Report ACR - 50.)

- ☐ CHEMICAL FOAMS, a progress report on Government research in the use of high expansion foam to control underground mine fires. Single Copies Free. (Write Publications-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigations No. 5632.)

- ☐ MAGNETOHYDRODYNAMICS, PLASMA PHYSICS & CONTROLLED THERMONUCLEAR PROCESSES, a 1959 bibliography, now available, compiled by the Avco-Everett Research Laboratory. Includes references to books, reports, conference proceedings and papers published in the open literature between 1925 and September, 1959. 97 Pages. (Available through military channels or at $2.50 from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for PB 161 825.)

- ☐ U. S. GOVERNMENT EDP, a directory-type publication providing information on the application of electronic computers to administrative, statistical and scientific work. Includes an inventory of computers in the Federal Government, except for those used for tactical and classified work in the Department of Defense. Gives recommendations for future EDP policies. 113 Pages. 35 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication No. Y 4.P 84/10: El 2/2.)

- ☐ METRIC MEASUREMENTS, a handy illustrated wall chart on metric measurements, showing the relationship to the system customary in the U. S. 50 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication No. C 13.10:232.)